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ABSTRACT

This issue covers the broad topic of electronic scholarly publication. Some 25 professionals in 20 libraries, consortia, and publishing enterprises were interviewed for this issue. A section on issues and trends for managers discusses the proliferation of roles and models; assembling the critical mass; licensing, copyright and interlibrary loan; partnerships; acquisition modes; collection management; archiving; publishing through digitization; training; publicizing and interfacing; evaluation; multimedia; staffing issues; and costs and cost models. Innovations at selected academic libraries are described. Topics include an overhaul of a university's consortial collections program as a result of access to electronic resources; electronic partnerships; maintaining electronic resources; digitizing locally-owned materials; the development of a client-centered library service model; license management and collaboration; an expenditure strategy; alternative free distribution model for journals; promotion of electronic resources; digitizing archival photographs; an examination of costs; providing access to fee-based electronic scholarly journals; addressing future storage problems; linking an electronic version of a guide to theory and criticism to scholarly journals; mounting electronic journals to libraries. Contact names, telephone numbers, and e-mail addresses are provided for each institution profiled. A future outlook for electronic scholarly publication concludes this issue. (AEF)

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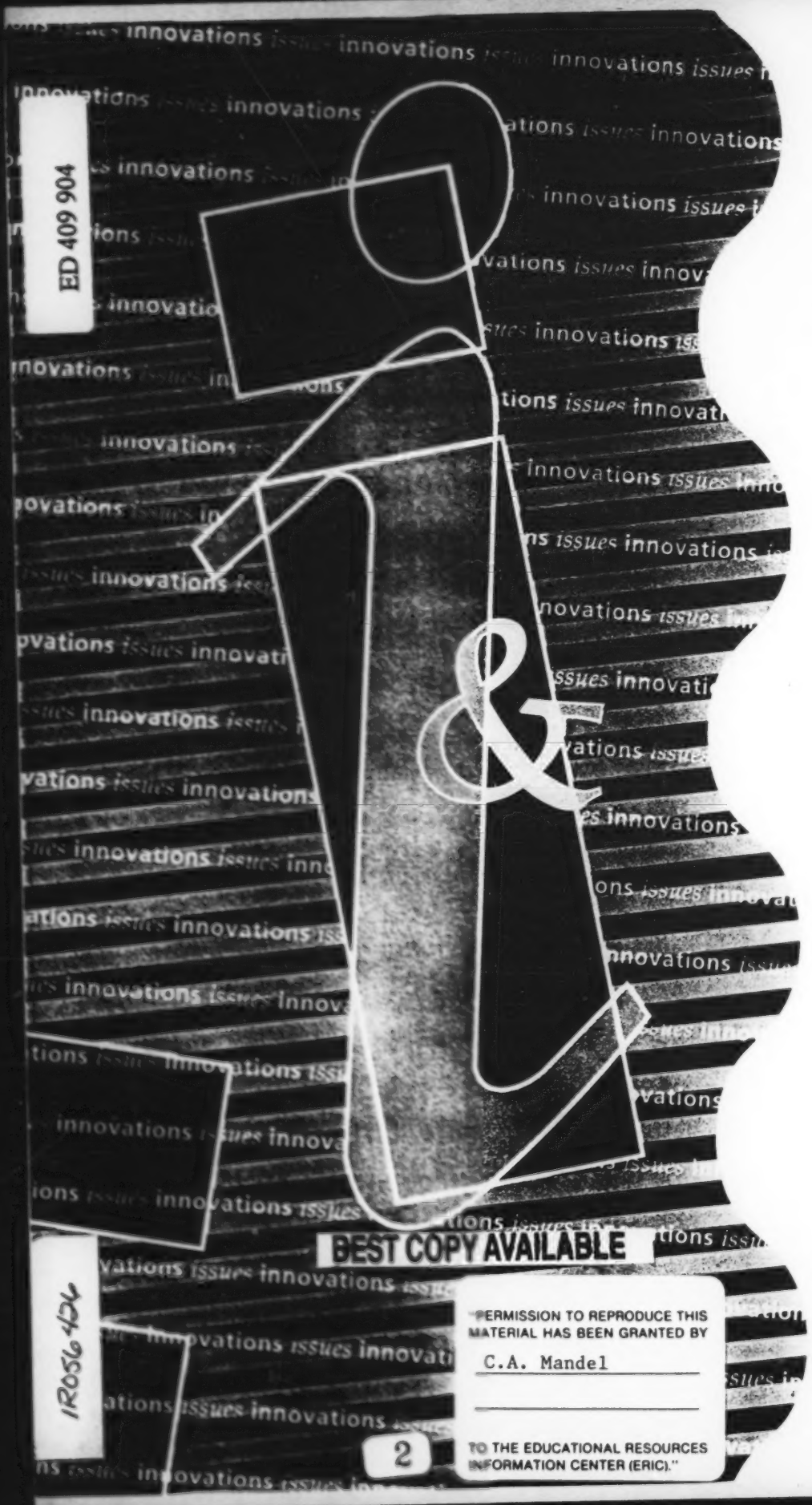

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Transforming Libraries *Issues and Innovations in* **Electronic Scholarly Publication**

JUNE 1997

3

Table of Contents

Introduction: A Word from the Editor 5

Issues and Trends for Managers 7

Innovations: Reports from the Field 17

A Miracle in California? 17

University of Michigan Library
in the Vanguard with Partnerships 21

Columbia University Libraries: Innovator and Partnerer 22

Johns Hopkins Library Confronts
Electronic Opportunities 24

Collaboration and Licensing
Are the Focus at Ohio State 25

OhioLINK Adopts Expenditure Strategy;
Cleveland State Benefits 26

Virginia Tech's Project Provides
an Alternative Distribution Model 27

Boston College Library
Makes a Key Strategic Choice 28

Emory University Library and
Scholars Press Investigate the Costs 30

Blackwell Ready to Premier
Electronic Journal Navigator 32

JSTOR Works with Librarians to Address
Future Storage Problems 33

Johns Hopkins University Press
Continues to be a Laboratory 34

Elsevier Introduces Science Direct 35

OCLC Continues Pioneering with FirstSearch
Electronic Collections Online 36

Electronic Scholarly Publication: the Future 38

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

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Introduction: A Word from the Editor

THIS ISSUE of Transforming Libraries covers the broad topic of electronic scholarly publication. Subsequent volumes of this publication may address specific topics brought up here. Some 25 professionals in 20 libraries, consortia, and publishing enterprises were interviewed for this issue. I am indebted to the professionals mentioned in the Reports from the Field for their thoughtful comments about trends, especially to Michael Jensen of the Johns Hopkins University Press. I am also thankful to a few others: John James of Dartmouth; Suzanne Thorin of Indiana University; Judy Webster of the University of Tennessee; Jim Campbell of the University of Virginia; and Ken Metzner of Academic Press.

Transforming Libraries
Issues and Innovations in
Electronic Scholarly Publication
JUNE 1997
3

Issues & Trends for Managers

ELECTRONIC SCHOLARLY publication is currently in a turbulent period, and though some in the field see prospects for stabilization and standardization, many professionals suggest that the complexity will simply grow. One person characterized the field as still in the "training wheels" stage; another suggested a gradual evolution from parallel play (pre-schoolers) to more mature relationships and behaviors. And though the field is perceived as currently having its challenging aspects, most professionals interviewed find it exciting and energizing. Another source quoted a faculty member who asserted that electronic availability of scholarly resources had enabled him, a heavy library user, not to visit an actual library for three years. All agree that change is happening at a faster rate than either libraries or library suppliers have been accustomed to. Few doubt the benefits of the advancing technology and the lowering of certain costs, which bring a wealth of scholarly resources to an ever-widening potential audience, including community colleges, public libraries, and even high schools.

Proliferation of Roles & Models

One dizzying aspect of electronic scholarly publication is the many roles that principals can adopt in its provision. Libraries are consumers of electronic publication, of course, but they can also be content creators, publishers, mirror sites for publishers, and publisher partners. Vendors can be publishers (either commercial or nonprofit), aggregators of publishers' products, or both. They sell to anyone who can buy, only to consortia, or only to individual institutions. One person suggested that this mixing of traditional roles and modes of distribution has had its counterproductive side—everyone is trying to do someone else's job. Libraries are becoming publishers,

publishers are becoming jobbers, and so on. Others see this "confusion" as temporary; they predict the future will see a return to the traditional roles and models that we have valued during the predominantly print culture.

Assembling Critical Mass

A clear trend, perhaps the clearest identified by virtually all those interviewed, is the push toward critical mass in content. The field has emerged from a predominantly experimental phase where an array of pilots were tried. Now everyone, both libraries and publishers, is focusing on building content. One vendor has set aside development of search engines to focus on content; another suggested they had underestimated the demand for content from libraries. Another expressed it as a "preoccupation with getting stuff up and available." Libraries and library consortia are preferring to negotiate contracts with journal suppliers, because these usually provide greater quantity. Science, technical, and medical titles are preferred because they account for a critical mass of library expenditure. It is a wiser use of time to negotiate a few larger contracts than a number of small ones. Several libraries expressed the trend toward critical mass in policy terms. "We buy everything electronic that fits within our collections policy, and when there is a doubt about fit, we err on the side of getting it." Often such strategic approaches originate with a vigorous leader, particularly someone new who has a mandate to move into electronic modes, but just as often it appears to be an approach that has evolved quickly in response to a veritable cornucopia of electronic resources.

Licensing, Copyright, & Interlibrary Loan: the Difficult Issues

Publishers are particularly concerned that their stock in trade can be so easily transferred electronically to unlicensed third parties without compensation; libraries want to preserve fair use of information. Interlibrary loan is the nexus of these concerns, and when there is a stumbling block in the negotiation of license agreements, it is often ILL. Some publishers have yielded, at least temporarily, agreeing that traditional ILL is possible (e.g., a paper copy can be conveyed to a borrower, but not an electronic copy).

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

Licensing negotiations have other stumbling blocks as well. Especially with publishers new to electronic publishing, there can be demands for excessive restriction (e.g., that only persons in a specific building may use a resource). Another commonly mentioned barrier is the expectation that the library will ensure individual users are authorized and that patrons use resources according to the terms of the agreement. These days, most libraries simply walk away from negotiations when publishers insist on unreasonable provisions.

Because of the complexities of negotiating license agreements, many libraries have named licensing "gurus," individual staff who are expert in licenses and their negotiation. The value, indeed the necessity, of having such a specialist was commonly stressed during interviews. Even so, most transactions must also go through campus contract offices.

Many professionals acknowledged that, as the "training wheels come off the bicycle,"—as both publishers and libraries become more sophisticated about each others' needs—licensing issues will become easier to deal with. Fewer publishers are requiring site-specific use and fewer libraries are demanding unlimited ILL. Some feel that aggregators and other sorts of jobbers will handle most licensing agreements in the future as part of their service to libraries. Blackwell has taken a step in this direction by establishing their online License Store, where potential subscribers to electronic journals can see publishers' licenses before subscribing.

Partnerships Are Critical

Most innovative projects and practices in the provision of electronic scholarly resources have been the result of new and intensified collaborations—both within and outside the library. In fact, there was no reported instance among the interviews in which a library had accomplished much on their own. One librarian characterized a significant change in her work that is attributable to the key role of partnerships—the technical side of the job has faded in importance and she has become a builder and maintainer of partnerships.

One of the most common partnerships is within consortia, many of which have been reinvigorated through development of cooperative discount buying. Examples mentioned in this issue

Transforming Libraries *Issues and Innovations in* Electronic Scholarly Publication

June 1997

3

include: the California Digital Library, VIVA in Virginia, the Chesapeake Information and Research Libraries Alliance (CIRLA), OhioLINK, and the Northeast Research Libraries Consortium. In some situations, consortia have been instrumental in moving libraries toward radical culture changes (e.g., agreeing to use the library's own funds to purchase resources that might not have been their first choice, but represent a clear consortial opportunity). Smaller institutions clearly benefit enormously from consortial buying, but so do their larger colleagues.

Another kind of partnership is between the library and other entities on campus. At the University of Michigan, early partners were the computer center and the library school. At Columbia and Johns Hopkins, strong relations with the university presses led to milestone projects such as JHU's Project Muse and Columbia's CIAO.

Finally, there have been important partnerships between libraries and publishers and other vendors. Some have been product co-development projects. Others have been alpha and beta test situations in which the library received the publisher's electronic scholarly "product" for free in return for reporting data on use to the publisher. Though these opportunities may be in decline now that publishers are focusing more on developing critical mass in content, they still exist and enterprising libraries should be on the lookout for them.

Many Modes of Acquisition

As with other functional practices, libraries manage the acquisition of electronic scholarly resources in different ways. The most noticeable trend is toward collaboration in the selection process—both inside and outside of the library. Though many new technologies tend to be approached collaboratively in libraries, through users groups, task groups, and so forth, electronic resources may be treated in this way for a long time to come as they often come in large expensive packages with a number of cross-jurisdictional issues to be resolved. One professional suggested that the day will come when even the most technologically sophisticated among us will look with fondness on the era of the book, particularly on its simple straightforwardness. When a purchase costs more than a single selector can afford, when there are serious legal issues in the licensing of the resource, and when there are questions about

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

whether the resource can be accessed within the host technology, other people are brought into the selection process: other selectors, technical services personnel, and library and computing center systems personnel.

Collaboration within consortia has already been mentioned, but it cannot be stressed enough that, for many selectors, working with people outside their organization to select commonly accessible materials—and using their library's own financial resources—is a very new mode of operating. Indeed, some purchases may appear to be thrust on an individual library through consortial pressure or other external political processes. Finally, several people suggested that while some selectors have taken to electronic resources like ducks to water, others have been slower to acquire the skills they need to deal with electronic materials and to work in collaborative modes of acquisition.

Collection Management in the Electronic Age

A big question for many administrators today is whether any collection management benefits will accrue from electronic scholarly publication. Chief among these is whether the availability of electronic resources will save any money through cancellation of print subscriptions, reduction of other kinds of duplication, conservation of space, and avoidance of further storage costs.

No rush to cancel subscriptions for duplicate print journals was indicated; in fact, there were relatively few reported instances of cancellations and none were based on electronic availability. This was attributed in part to the deep discounts publishers offer to libraries that retain duplicate print subscriptions, but more often cited is the enormous culture change that academia must undergo to relinquish print and accept dependence on electronic formats. Several librarians also cited serious concerns about archiving; until they were certain that journal backfiles would be archived somewhere, they were not about to give up print copies.

Much more likely to happen is the cancellation of most duplicate subscriptions to print materials, particularly reference resources such as *Books in Print*, when the electronic version is available. Several respondents indicated that cancellations would happen inevitably, simply as a factor of rising costs and declining buying power, and that availability of electronic alternatives would be considered along with other factors. Or, as one person stated, it will

happen "when a selector is looking for money for a new purchase and can only find the money by canceling an existing title; print subscriptions that duplicate electronic versions will look very tempting." Occasionally, libraries make minor collection management decisions as a result of the excellent usage data often provided by the software associated with electronic resources; thus, a library can move a resource to or from a network, or adjust the number of simultaneous users.

Archiving: a Central Issue

Everyone—libraries and suppliers alike—is concerned about archiving. Most libraries, as noted above, are continuing to purchase and store print versions of publications (no library interviewed is printing and binding from electronic resources). Yet several pointed out that this is a partial solution at best, as electronic versions will increasingly diverge from print versions (for example, electronic versions might have supplementary datasets or audio-visual material). No library was trying to archive electronic journals (unless, of course, they were the publishers). Moreover, commercial publishers are reluctant to make promises of perpetual archiving; for many, there is simply no profit—in fact, a large potential loss—in archiving for general access since older materials, in their experience, simply are not used much. The best current hope appears to be consortia. OCLC, for example, has committed to archiving significant backfiles; their access to the Ohio Supercomputer is a huge advantage in this endeavor. In any event, no one could imagine a single entity taking responsibility for archiving all electronic scholarly publications.

Yet, even if the storage issues were solved tomorrow, one professional brings up important questions: What does it mean to archive an electronic publication? Does one archive the links as well? What about copyright on the links? Even if permissions are secured, who provides space for storing millions of bytes of potentially extraneous information?

Publishing through Digitization

The easiest way for a library to become an electronic publisher of scholarly resources is to digitize materials to which it has rights and

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

distribute them on the World Wide Web. Many of the libraries profiled here have taken this approach, with the most popular content being photographic archives. But a few, are looking at other possibilities as well. Dartmouth is planning to digitize some older gift collections that are now in the public domain, and several libraries are archiving and making available local scholarly resources—dissertations, theses, faculty and student projects, and reports. The University of Tennessee Library has taken an opportunistic approach and is currently digitizing photographs of the Smoky Mountains, out-of-print UT Press titles, and musical scores from their Galston Busoni Archives.

Services: Training, Publicizing, & Interfacing

While the average undergraduate will find the electronic resources they need and jump in with both feet, electronic scholarly publication presents a host of training and interface problems for most other users, as well as for many library staff. As one librarian suggested, "The situation is getting worse as more people have to know more about individual systems." For many public services staff, there is a serious need to know about new electronic resources before they are made available to users so that staff can effectively respond when asked for assistance; this requires continuous upgrading of skills and knowledge.

Training is essential in two major areas: 1) skills in connecting to and manipulating specific resources and 2) knowledge of license restrictions. The latter is usually handled online, and the University of Michigan tries to negotiate a uniform license so that users will not be plagued with variations. The former is somewhat more difficult, as it often is accompanied by interface problems. Though the Web has obviated a number of interface problems (one person suggests the Web will remove almost all of them), users still typically need a certain version of a browser and many are trying to connect using earlier versions. Sometimes patrons are using inadequate computers. And then there is printing. "Printing is the training problem from hell," said one person, echoing the sentiments of several others. Many electronic resources are developed to be operated on a single printer setting; when users try to print on their own remote printers, trouble calls result. The problem is complicated by the fact that most users want to print rather than download, and many libraries are not yet charging for in-house printing.

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

Libraries are handling training issues in a number of ways. Traditional methods such as classroom and point-of-use training are used, but classroom training has drawbacks: most users will not retain much of what they learn unless they have to use it immediately, and training them in a specific tool may have limited value. One library is moving toward vesting all training in one person, the new data librarian. Another is hiring a person to manage interfaces in hopes that the training problems caused by interface problems will eventually disappear. Another library, in its staff training, is moving from a focus on specific resources to a focus on a larger understanding of how electronic resources work in general, hoping that eventually skill in using new resources can be picked up by the staff without mediation. As reported below, Johns Hopkins is reconsidering its whole approach to training and is beginning to reconceive the electronic library as one that will simply deliver information without expecting the user to become trained in using electronic resources.

Marketing resources to users is a key agenda in many libraries. One found that fewer than half the faculty had signed up for a free document delivery service even after aggressive marketing by the library. Again, marketing takes several traditional forms: newsletters, flyers, bulletin board announcements, visits to faculty meetings. Publishers usually supply marketing materials (bookmarks, flyers, etc.) when you purchase their product or service. Of course, online publicity over local area networks is also popular. However, no one has figured out how to compel attention to electronic resources, given the constant torrent of other information bombarding members of the library community.

Evaluation

Most libraries are using only passive transactional data in evaluating electronic resource use such as the numbers of hits and downloads. Such data enable libraries to make collection management choices, but most wish they were doing more evaluation. Vendors also rely on passive data for the most part, with one reporting that an online survey received only a few responses from users.

Most intensive evaluation seems to take place during product and service development. In fact, users can be involved in the actual design of a new product. Less intensive are focus groups, which have been used in a number of product developments. Elsevier uses

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

its large telemarketing department to gather data directly from users; some 400 comments were fielded during the development of its Science Direct service, and many suggestions were actually incorporated.

Interviewed professionals suggested that evaluation—even basic research—was needed in several areas. One is the need for projections of the impact of electronic publishing on library space. Another is the need for close analysis of costs—can electronic publishing in fact deliver the product faster, cheaper, better?

Multimedia

One of the great seductive promises of electronic scholarly publishing is multimedia: the actual sound of a chirping cricket accompanying text on cricket mating habits; video clips of Charles de Gaulle delivering a speech; supplementary datasets that are manipulable when downloaded. Yet, while there are many instances of multimedia among electronic scholarly publications, it has hardly permeated the field and has not yet lived up to its promise. Most instances, in fact, are static visuals accompanying scientific, art history, or popular culture texts—hardly a great leap beyond print.

At least two publishers, Elsevier and Academic, are concentrating on the development of supplementary data services in response to a seemingly insatiable demand from scholars and students for data. An example might be the actual datasets related to reported research on the relationship between second-hand smoke and infant disease. Here is clearly a distinctive product that can be offered electronically and will be valued by scholarly users; other researchers will be able, perhaps, to supplement their own data, and students will be able to use the data in their own research projects.

Staffing Issues

Many staffing implications have been suggested above, but they deserve summary here. The challenges of servicing electronic resources has prompted several libraries to create new job titles: interface technician, data services librarian. More significant is that traditional jobs, such as collection development officer and head of acquisitions, have changed radically with the advent of electronic

resources. Negotiating licensing agreements takes up a significant amount of time in many libraries, as does the need to collaborate with a number of new partners—in diverse internal functions, within consortia, and with vendor partners. Other shifts appear to be in the works. Services staff need to know how to help students and faculty use electronic resources effectively. As electronic modes offer so many built-in capabilities for access, the need for detailed cataloging is also coming into question.

Costs & Cost Models

As perhaps with any relatively new technology, one of the big unanswered questions about electronic scholarly publication is how much it does and should cost, especially relative to the models for print resources that are familiar to most library managers. No library interviewed suggested that they were saving money (one of the hopes for electronic resources); in fact, many appeared to be spending supplementary funds, either from their campuses or from consortia, to support electronic acquisitions. In some cases, choices have been made: electronic versions have been preferred to duplicate paper versions and it is assumed that some savings have resulted.

Complicating the situation is the great variety of pricing models. Some electronic resources are free (at least during pilot projects), some are priced in the aggregate, and some print versions are deeply discounted when they are retained as duplicates to electronic versions. There are also built-in biases in some libraries related to paying for access as opposed to paying for tangible property, and paying for electronic backfiles which duplicate paper runs.

While libraries have their own issues related to costs, at least two publishers suggested that they would not make a profit with electronic resources for some time, especially not until development costs had been recouped. Everyone suggested that stable cost models need to be developed and real costs need to be assessed and described. Though some work is proceeding in this area, it is likely to be a while before cost models are created and real costs are understood.

Innovations: Reports from the Field

INFORMATION professionals in several libraries and consortia active in electronic scholarly information were interviewed. The subjects of these reports range from the University of California system, which is attempting a radical overhaul of its consortial collections program as a result of access to electronic resources, to Boston College Library, which, has taken a comprehensive approach as a consumer of electronic resources.

A Miracle in California?

The University of California is about to begin creating what may eventually be a miracle: a truly comprehensive, integrated approach to electronic scholarly publication that will directly serve its more than 200,000 faculty, staff and students, and potentially a much broader segment of the state's citizenry. Though final approval and funding are pending just one more committee recommendation, the University's Library of Tomorrow is sparking great excitement throughout the institution and gaining strong support from a broad constituency.

The Library of Tomorrow initiative has had a slow birth, beginning during the late 1980s/early 1990s with the realization that the University's pioneering 1977 Plan was no longer working in the emerging environment. The story is a familiar one to most academic research libraries: library materials prices and technological advances were outstripping the UC libraries' ability adequately to meet the needs of students and researchers. Nearly ten years later, this sense of crisis has reached significant proportions in the University community. The recent words of Charles F. Kennel, Executive Vice Chancellor of the UCLA campus and Chair of the Library Planning Initiative's Advisory Task Force, sound a call to decisive action:

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

There is indeed a serious library crisis ... which threatens the ability of UC's libraries to support adequately the University's education, research and public service missions.

The crisis in scholarly and scientific communication is not confined to UC; its impacts are international.

Current practices, including the building of nine comprehensive research collections, cannot be sustained. The libraries have been leaders in re-engineering processes for operational efficiencies, but further re-engineering to achieve additional cost savings, while practical in limited instances, does not address the fundamental crisis.

Solutions to this crisis need involvement from all stakeholders; the libraries cannot solve it alone.

Certain immediate strategic actions need to be taken as steps to building a foundation for a sustainable UC library system.

These critical assumptions underlie the development of a multifaceted program. If it comes about, and all indications are that it will, the UC Library of Tomorrow will have the following key components:

- The California Digital Library (CDL) will have primary responsibility to license, acquire, develop, and manage electronic content and to facilitate access to such content. The Digital Library—and this is the truly innovative part—will be the tenth library in the UC system with its own executive director, budget, staff, and broad-based governing board. CDL's first focus will be on the needs of UC students, faculty, and staff, but eventually it will facilitate access to others in the state and beyond. It will license and acquire electronic content in support of campus research and academic programs and manage such content to assure its efficient and effective delivery to all members. It will also develop a centralized delivery mechanism for electronic materials; encourage the migration of selected campus-based content into the CDL; support digitization of paper-based materials; establish policy and procedures for archiving electronic content; encourage and support electronic publishing by UC faculty; assist the campuses in providing user support and training; and foster standards for effective interoperability.
- As its first strategic initiative, the CDL will create a Science, Technology and Industry Collection beginning in fiscal year 1997/1998. The STI Collection will be developed by the CDL in

partnership with library staff and faculty from all of the UC campuses, who will participate actively in determining content for the collection, design of the access mechanism, and provision of support to users. At first, the collection will provide broad coverage of a critical mass of publisher-produced electronic information in the health, life, physical and engineering sciences. In later phases, it will incorporate less mainstream resources, such as University-produced technical reports, patents, preprints, and datasets. One potential focus will be on areas that the University has designated as high priority for industry initiatives: biotechnology, microelectronics, and information technology. A key function of the STI Collection will be a learning laboratory of organizational, technical, financial, policy, human resources and training issues for further initiatives.

- CDL will take a new approach to resource sharing that will include: 1) a swift migration to electronic journals to reduce the demand for interlibrary loan for a growing portion of journals since they will be available online, 2) implementation of a system of direct borrowing between UC campus locations, and 3) outsourcing for an expeditious, reliable delivery service. With direct borrowing in place, a member of the University community will be able to request and receive material with minimal manual intervention.
- Intersegmental cooperation between the UC system libraries and those of the California State University system is another strategy for making maximum use of state resources. Library directors from both systems are looking at several collaborative projects for accomplishing the following:

  Providing joint union catalog services by developing reciprocal access through Z39.50 interfaces to the UC MELVYL Union Catalog and the CSU Unified Information Access System;

  Establishing joint consortium contracts and interagency purchasing agreements for information resources and services, thus leveraging the buying power of both universities for measurable cost savings;

  Strengthening programs, such as overnight point-to-point document delivery, for the cost-effective transfer of physical information resources;

  Cooperatively exploiting technologies that enhance access to information resources and facilitate resource sharing;

  Developing cooperative programs for user and staff training and support;

  Supporting joint initiatives of the UC and CSU systems, such as outreach to K–12 education and to the business community;

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

Supporting regional and individual campus cooperative initiatives.

- Extending intersegmental cooperation through development of the Library of California will further distribute the economic base for the California Digital Library.

In order to develop the critical mass of content that is so necessary to the success of such projects as the CDL, planners have been negotiating with a number of commercial and academic partners and vendors.

The Library of Tomorrow initiative is the product of intense environmental factors. Chief among these is the crisis that has finally propelled the University into a radical strategic direction. Another factor, however, is the engagement and commitment of the University's leadership, especially embodied in the concept of the Cyberlibrary as articulated by UC President Richard C. Atkinson. Acknowledgment of the crisis and support from leadership led to the formation of a planning team, whose members were given substantial long-term assignments and time away from their regular jobs. This team is led by Richard E. Lucier, University Librarian at the San Francisco campus.

In addition to the development of the California Digital Library, the planning team continues to look at other innovations, including the formulation of new business models to sustain access to scholarly information. Currently, this library planning and action initiative is scheduled to proceed through February 1998.

Though the vision of the UC Library of Tomorrow is truly innovative in its plan for organizing, staffing, and exploiting the vast resources of the UC system and beyond, perhaps the greatest achievement has been in overcoming the difficulties in getting nine major libraries (including seven ARL members) to agree on such a radical new approach.

(N.B. Portions of the wording of this report were taken directly, with permission, from planning documents currently available only within the UC system.)

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Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

University of Michigan Library in the Vanguard with Partnerships

The most innovative libraries in electronic scholarly publication have worked in a variety of partnerships, and the University of Michigan Library is no exception. Michigan's quite extraordinary history with electronic resources started with a partnership between the Library, the campus Information Technology Division, and the School of Information. Out of this partnership came joint funding for both the umbrella Digital Library Initiative and an operations-focused Digital Library Production Service Unit, presided over by Wendy Lougee and John Price-Wilkin respectively.

Michigan's publisher partners have included McGraw-Hill, Grolier's and UMI. Michigan was also one of the original ten Elsevier TULIP sites. More recently, a partnership has developed with the Human Relations Area File (HRAF), which has contracted with Michigan to put their files online. Another important partnership is evidenced in the Library's active role in the CIC, for which they host selected licensed resources, share middleware, and provide training. Michigan has also been active in contributing to the electronic scholarly resource base through its American Verse Project and the Middle English Prose Project, both of which encode text in SGML from cover-to-cover, an approach endorsed by literary scholars.

To evaluate electronic scholarly publication products that they develop, Michigan uses an iterative process involving the user from the beginning. The Digital Library Registry enables librarians to put the "best of the net" online for their clients, reinforcing the role of the library as information provider on campus. They are in the process of filling a new position that will focus on constructing interfaces that work effectively in the provision of electronic scholarly resources.

Both Lougee and Price-Wilkin stress the importance of working at partnerships. In fact, Lougee considers herself not a technologist, but rather a partnership-builder. Much of her work consists of convincing prospective partners that there are strong mutual benefits in joint ventures. Lougee characterizes the dynamic as moving from self-centered to more mature working relationships. It has also helped to identify funds to seed projects as well.

As one of the first libraries in the country to move into

Transforming Libraries
Issues and Innovations in
Electronic Scholarly Publication
JUNE 1997
3

electronic scholarly publication in a significant way, Michigan is now moving from an experimental, developmental mode to a production mode, focusing on building the critical mass of resources available to their users.

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Columbia University Libraries: Innovator and Partnerer

The Columbia University Libraries have long been an active pioneer in the provision of electronic scholarly information—from innovative methods of organizing to provide electronic information to creative partnerships with publishers. Two particularly innovative current projects are Columbia International Affairs Online (CIAO) and Online Books.

Online Books is a partnership with several publishers—Columbia University Press, Oxford, Garland, and Simon & Schuster Higher Education—with funding from The Andrew W. Mellon Foundation. Nearly 70 monographic titles have now been converted to HTML format from the original electronic tapes used by typesetters in the production of print books; a total corpus of 200 to 300 titles is planned. All are mainstream scholarly titles that are available online to the Columbia community for the duration of the project. One benefit of the project is the gathering of data on how scholars and students who depend on books, as opposed to journals, might fare in the electronic environment. In return for free provision of texts, the publishers are receiving very valuable market research data from the project. Deputy University Librarian Carol Mandel comments that the strong partnership between the Libraries, the Academic Information Systems (AcIS), and Columbia University Press has helped the project enormously; it has also been a tremendous benefit to reside in the "publishing capital of the world."

CIAO, a new electronic publication of Columbia University Press in partnership with the Libraries and AcIS, publishes the papers of political institutes from all over the world; it will be

Transforming Libraries *Issues and Innovations in* **Electronic Scholarly Publication**
JUNE 1997
3

demonstrated at upcoming library conferences.

Tony Ferguson, Associate University Librarian, who is in charge of collections at Columbia, has been managing electronic resources for a long time. Tony has identified two basic modes of origination for the acquisition of electronic resources. In the highly decentralized Columbia system, many requests come from bibliographers, who often pool resources to purchase electronic materials of benefit to more than one program. Sometimes proposed purchases originate with the Northeast Research Libraries Consortium; these tend to be larger packages, such as Academic Press' IDEAL.

For the past several years, all electronic purchases at Columbia had to have "parents," librarians who proposed the purchase and were willing to take ongoing responsibility for certain aspects of monitoring and maintenance. This concept has become formalized, and persons with such responsibilities are now called "Network Resource Coordinators." Coordinators are responsible for everything from representing the proposed purchase to publicizing its availability to faculty and students, but especially for continually testing the functionality of an electronic publication—a necessity when services and software change so quickly and frequently. Even with a new set of clarified responsibilities (see documentation on the ARL Website), Ferguson does not see the concept as ultimately scalable. "What happens when we have 9,000 separate electronic resources and must divide responsibility among our librarians?" he asks. One of the reasons for this mode of organization is the proliferation of available electronic resources and the incredible variety in license arrangements and technical requirements. Ferguson hopes that the entire field will become less chaotic, and more uniform over time.

One exciting entrepreneurial project at Columbia has been the development of discipline-oriented Web pages, where librarians are active in mounting resources for clientele. Appropriate resources that are free or free on trial can be mounted on the departmental Website. When such resources carry a modest fee, there is a small budget to take care of expenditures.

Columbia has not yet begun canceling as a result of the availability of electronic resources, but their budget allocation system (each selector manages their own budget) is set up to discourage unnecessary print duplication. "If you have to use 'your' funds to purchase a duplicate resource, you consider the decision much more carefully," says Ferguson.

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Johns Hopkins Library Confronts Electronic Opportunities

The Milton S. Eisenhower Library at Johns Hopkins has been pushing the envelope in the area of electronic scholarly communication. Expanding experience in the electronic arena and initiatives in program evaluation and market analysis are prompting the library to rethink the learning library concept. Focus group sessions and conversations with students and faculty are encouraging a more client-centered or special library service model. The focus shifts from preparing competent users of the library to enabling them to become effective consumers of information in an increasingly electronic and remotely-available environment. "The typical Hopkins undergraduate," says Library Director Jim Neal, "wants the information needed to complete the assignment, and not a tutorial in library use." The client-centered approach will require the development of new strategies for service and information access.

Like many other research libraries, the Eisenhower Library is building a critical mass of electronic resources partially through cooperation with other Hopkins libraries and CIRLA (the Chesapeake Information and Research Library Alliance). Joint investment in electronic materials and technologies provides a wider range of capabilities.

A new library facility, the Digital Knowledge Center, is enabling new initiatives in the creation and distribution of electronic scholarly resources. Libraries are investing heavily in digitizing of locally-owned materials, and this is a significant contribution to the enrichment of scholarship. Neal points out the need to move beyond the format change to add new value to electronic access and use.

The cooperative project with the Hopkins Press, Project Muse, is an example of a rich electronic database with new capabilities for teaching and research using electronic journals. Other initiatives are creating databases of fluid dynamics text, sheet music to be linked to sound files, Maryland county maps, and university archival records.

Transforming Libraries *Issues and Innovations in* **Electronic Scholarly Publication**
JUNE 1997
3

Websites supported by electronic materials are being created for individual courses and faculty research projects. Another project is drawing upon the expertise of faculty in the School of Engineering in development of digitizing-on-demand for materials in remote storage using robotics technology and providing delivery to the desktop.

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Collaboration and Licensing Are the Focus at Ohio State

The OhioLINK member library directors have set a clear agenda: move expeditiously into as much full electronic text as possible. This emphasis on consortial purchasing has changed the nature of daily work for many staff in the OSU Libraries. As an OhioLINK member, the Libraries are spending much more time in collaborative activities, according to Collections Officer Gay Dannelly, who estimates that she now spends about seventy percent of her time on either electronic resources or consortial matters. And with the addition of private institutions such as the University of Dayton, Kenyon College, and Oberlin College, the number of collaborators has increased. At service desks, staff are required to be generalists more than specialists in their approach to users and must have a working knowledge of the available electronic resources.

Like many other ARL libraries, Ohio State has a dispersed system for selecting electronic resources, with some recommendations coming from individual selectors, some from consortial partners, and some originating with University Librarian. Whatever the point of origin for selections, OSU is well organized to handle licensing arrangements with vendors. Librarian Trisha Davis has achieved a national reputation in the area of electronic resource license management. According to Davis, what makes a viable license are clear definitions of terms, users and sites. For Ohio State, this would provide the rights for all university faculty, students and staff to have access to electronic materials through their IP addresses; they prefer not to work with individual passwords.

Davis notes that there have been—and for the foreseeable future will be—problematic areas in license negotiations, though she also notes that vendors are becoming more sophisticated about library

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

needs. Those new to license negotiation need to be on the lookout for: 1) unnecessary restrictions based on physical location (often at the specific building level) or by method of access; 2) hidden penalties, such as charges for late payment (not always under the library's control) or damages to discs; 3) any requirement that the library take responsibility for the behavior of users.

One key to success in managing licensing agreements at OSU is the goal of consistency among licenses. Education of patrons concerning use restrictions is much easier if all licenses provide much of the same components in terms of capabilities, use restrictions, and user obligations.

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OhioLINK Adopts Expenditure Strategy; Cleveland State Benefits

As a consortial consumer of electronic scholarly publications, OhioLINK represents 54 academic libraries in the State of Ohio. Tom Sanville, Executive Director of OhioLINK, manages the acquisition of electronic resources for the consortium. Their acquisition strategy has been to work with larger commercial vendors, such as Academic Press and Elsevier, whose publications represent a sizable portion of the consortial libraries' expenditures. Adoption of this strategy recognized the labor intensity and cost of negotiating statewide licenses at a time when the terms for these licenses are not yet standard.

As chief negotiator of licenses for OhioLINK, Sanville finds that most publishers want to negotiate a contract of the magnitude represented by the OhioLINK libraries to a mutually satisfactory conclusion. Sanville feels the keys to successful negotiation of license agreements are to focus on the practical and doable versus the philosophical, and to keep working at the process. The best negotiators on both sides are willing to stretch and flex.

OhioLINK libraries are generally not yet canceling journal subscriptions as a result of access to electronic scholarly resources. Selective cancellation throughout the consortium is an ultimate goal,

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

but first planners want to make the system work so that there is increased trust; this will involve partnering with the Ohio Supercomputer Center to arrange for storage of archives. All licenses negotiated by OhioLINK have a right-to-archive clause. It remains simply to set up the arrangement with the Supercomputer Center.

OhioLINK libraries are contributing to scholarly publication through a number of digitization activities. There are efforts to coordinate technical assistance for these projects, as well as to prioritize them on a system-wide basis. Projects focusing on the Great Lakes and the Wright Brothers, for example, have received priority support.

Being a member of the OhioLINK system has clearly benefitted Cleveland State University Library, enhancing the library's decisive move into electronic collections, according to Interim Director George Lupone. Though they have selected many electronic resources for local mounting, OhioLINK is by far their largest provider, with an estimated 1,200 Elsevier titles about to come online for users.

Cleveland State is also one of 12 libraries currently partnering with Blackwell in developing its electronic journal subscription services, and there is a project with Cleveland Public Library and the Western Reserve History Society to digitize photographs of Cleveland. Lupone credits a very resilient staff with making their plunge into provision of electronic resources successful.

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Virginia Tech's Project Provides an Alternative Distribution Model

The University Libraries' Scholarly Communications Project at Virginia Tech distributes 16 active journals free over the Internet. Two-thirds of these titles are also available by paid subscription in print form. None of the journals are costly, yet the project provides an exciting model for distribution of certain kinds of refereed scholarly material.

The major goal behind the program of free distribution is to broaden the readership of the journals. Journal publishers and editors understand that their paid subscription base is likely to remain relatively stable—they simply want the journals to be available to more readers throughout the world. An added benefit will be some expansion of the print subscription base. Librarian Gail McMillan especially directs first-time users of their Website to look at the *Journal of Technology Education*, which is available in electronic and paper forms, and the *Journal of the Society of Philosophy and Technology*, available only in electronic format.

The Libraries are also taking responsibility for archiving the journals in the project. Partnering with the Graduate School, they are archiving Virginia Tech's theses and dissertations electronically and making them available to the scholarly world on the Internet. Moreover, there are several "opportunistic" projects underway: scanning and making available over the Internet images from the Norfolk and Western Railroad Archives, and oral histories which include sound clips.

At this point, Virginia Tech still considers itself an experimental rather than a production operation, but they are moving into a focus on production of content, as well as continuing their archiving function. One advantage at VTU is the high degree of computer literacy among virtually all users. McMillan comments that comfort with technology is simply part of the culture.

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Boston College Library Makes a Key Strategic Choice

Early in Jerome Yavarkovsky's tenure as Director of the Boston College Library, an important strategic choice was made: to get everything available electronically that fit within their collection policy and to deliver it to the user's desktop. This choice has controlled the development of the Boston College Library Digital Library, "an online aggregation of electronic collections, networked services and diverse information resources in digital form." It has resulted in a team approach for selecting of materials; an aggressive marketing program on campus; a services-first Website design; a

Transforming Libraries *Issues and Innovations in* **Electronic Scholarly Publication**
JUNE 1997
3

generous printing policy; and the beginnings of a cancellation effort.

While the selection of print resources is still mostly the province of individual selectors, each of whom has a sizable budget to manage, electronic resources are recommended to the Information Resource Development Committee, a broadly representative group of 16 staff who consider each proposed purchase from several angles—systems, circulation, technical processing, public services. The group includes staff from outside traditional collection development arenas, as well as key non-librarian staff. Each recommendation has a sponsor, who attends the meeting at which their proposed purchase is being discussed. Supplementary allocations for electronic resources have considerably helped the process of making choices.

Though the Library is very active in promoting electronic resources through print media—newsletters, flyers, etc.—the centerpiece of its promotional activities for the BCL Digital Library is a series of visits to academic departments by Director Yavarkovsky, Collections Officer Jeremy Slinn, Public Services Head Kathleen Carney, and the appropriate subject specialist. A significant part of each visit focuses on electronic services. Currently, the visits focus on their campuswide access to CARL UnCover, as well as the copy and delivery service that they have initiated for materials housed in the Library. This service was developed in response to the paradox that interlibrary loan delivery from another library was more convenient for the user than finding and copying materials in the libraries on campus. Even with such an aggressive program, recent figures indicate that only half of the 600 faculty have signed up as subscribers to CARL UnCover. Yavarkovsky cites the inundation of competing messages as a key factor in marketing electronic resources. One approach currently being tried is to designate someone in each department, often a graduate student, as liaison for the Digital Library. A key responsibility of the liaison will be to make sure that departmental members have information about electronic resources and services. One means of encouraging use of electronic resources has been the provision of free printing in the library; however, they are currently considering a fee-based system, using debit cards, for full-text workstations.

A commitment to electronic resources has influenced design of the library's access systems. At the library's Website, for example, opening pages take users directly to electronic services and collections, bypassing the general information and orientation pages. Because the emphasis is on building a critical mass of electronic content, there is some unevenness in ease of access from resource

Transforming Libraries *Issues and Innovations in* **Electronic Scholarly Publication**
JUNE 1997
3

to resource, but staff report that users at Boston College cope well with multiple interfaces. The library continues to work on development of a simple one-stop interface for all resources.

The Boston College Library is one of the few encountered in this series of interviews that was canceling print subscriptions—albeit very selectively—as a result of their approach to electronic resources. Cancellation is considered only when it is clear that providers will assure permanent access to archival copies.

Though evaluation of electronic resources, in this early phase, has been mostly anecdotal, the library has used passive-use statistics to decide which resources would be available on the network (medium to high use) and which on stand-alone machines (low use).

Finally, the Library is beginning to make its own contribution to electronic scholarly publication with plans to digitize archival photographs of Boston; the Eugene O'Neill archives; selected Irish photo collections; and the Liturgy and Life Collection of Roman Catholic liturgical materials, including realia from the 1950s and 1960s.

Though most of the activity in the BCL's Digital Library program can be found in the programs of other libraries, what is truly distinctive is the clear strategic choice they have made in attempting to build a strong critical mass of electronic resources in a short period of time.

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Emory University Library and Scholars Press Investigate the Costs

A formal program to distribute scholarly journals electronically came about through conversations between the Emory University Library and the Scholars Press, Emory's "unofficial" press. The Mellon-funded project, part of the Virtual Library Project, now

publishes four of the Press' journals, which can be found at the Website given below. These titles were selected because they represent a variety of challenges—non-Roman text, images, etc.—and because of their significance to their disciplines, based on the recommendations of Scholars Press and their journal editorial boards.

The project is asking basic questions: Is it really cheaper to publish electronically? Where will the cost centers be in the electronic mode of publication? As with the Virginia Tech project, a major goal of the project is to determine if simultaneous electronic publication will widen the readership of the journals (the largest subscription base among them is 1,800). For this reason, electronic access is free able to everyone via the Internet during the pilot project. The current cost analysis will determine whether free distribution will continue after the pilot.

One discovery of the project is that there are often technical barriers at subscriber sites—Departments of Religion and Philosophy (where many subscribers reside) can be among the last to automate. Other issues arise as well; for example, one publisher of a journal distributed by Scholars Press was willing to give permission to copy an image from the print version of a journal, but not from the electronic version.

Another part of the experiment focuses on whether availability of archives affects use of a journal in general. The entire archive of one journal is being digitized, and the maintenance of this part of the study will be handled by Emory's Theology Library.

The Emory Project represents a kind of basic research the field of electronic scholarly communication sorely needs. Is it cheaper, faster, better to publish electronically? The Emory Project will provide some very interesting—though certainly not final—answers.

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Vendors have figured prominently, of course, in the development of electronic scholarly publication. The following are reports of interviews with a few vendor representatives that illustrate significant trends in the field.

Blackwell Ready to Premier Electronic Journal Navigator

Sharon Cline McKay of Blackwell characterizes the present phase of electronic scholarly publication as the "training wheels" stage. As others have commented, it is definitely a phase of building critical mass in content. Thus, the ultimate goal of Blackwell's new Electronic Journal Navigator service is to provide access to fee-based electronic scholarly journals. To this end, they have been partnering with 50 libraries worldwide since June 1996 to develop the Navigator service. The service became available in January 1997, with a present roster of 366 titles. Actually, McKay says that the limitation to paid subscriptions is under discussion, as several libraries have indicated that they would gladly pay to have an aggregator such as Blackwell manage access to free electronic journals for them as well.

McKay stresses that Blackwell is a handler, not a publisher or licensor. License agreements for journals distributed by Blackwell are always thus between the subscriber and the publisher. (The Blackwell family has separate interests in publishing companies such as Blackwell Science Ltd., which are not managed as part of the Blackwell Ltd. Group.)

Though Blackwell is concerned about archiving journal content, they are currently planning on providing only three years of back-files by linking to publishers' servers. As an aggregator, they are not prepared to take permanent responsibility for archiving; they expect that no one entity will archive everything and they are hoping that such responsibility will be accepted by organizations such as OCLC and PALINET. Blackwell does plan to establish links to all archive sites that are appropriate for the materials being delivered through the Navigator service so that libraries will have continuing access to archives.

The main focus of the Navigator service is on science, technology, and medical publishers, as they appear generally to be further along with technology and they seem to fill a more urgent need for libraries. In fact, notes McKay, Blackwell learned some very interesting lessons from librarians during the year-long pilot of the Navigator program; perhaps the most important message from librarians was to keep it simple—especially strong was the message not to

develop new sophisticated search engines at the expense of developing more content.

Navigator will link to a serials subscription management system called CONNECT, which enables librarians to go online, find out information about subscriptions, place claims for electronic issues that have not been received, etc. The Navigator service has another convenient feature: you can subscribe through another agent and access the journals through Blackwell. Finally, it will offer what Blackwell is calling "transaction purchasing." Anyone who goes into the system will be able to request a copy of an article and pay for it directly as an individual consumer. Publisher restrictions may apply and users will be prompted for payment only if they or their institution do not hold a subscription for that journal; otherwise, they will get full text automatically.

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JSTOR Works with Librarians to Address Future Storage Problems

Librarian advisors at the University of Michigan played an important role in the development of JSTOR, the service that provides electronic access to the backfiles of important scholarly journals. Librarians helped steer development of both product content and policy; they provided key advice to the technical team as the system evolved. JSTOR includes three primary databases: a page image database for accessing actual content; a searchable full-text file created using OCR software; and a database of tables of contents and citations, the organization of which was especially dependent on librarians' input. The interaction of these databases provides a great amount of flexibility in using JSTOR.

In the second instance, JSTOR worked with both librarians and publishers to develop an interlibrary loan policy that is currently in a two-year trial period. During this time, libraries may use materials printed from JSTOR freely, but they are asked to record ILL transactions so that an ILL policy can be developed at the end of the test.

One of the appealing aspects of JSTOR is that it allows cross-disciplinary searching across all journals in the database. In development is technology that will link current issues of journals to backfiles so that scholars can trace, for example, the emergence of a

theme within a specific journal, searching from the most recent issue back through the first issue published.

Kevin Guthrie of JSTOR considers their initial effort to be very successful: 198 libraries have signed up under their charter subscription discount—more than twice their expectations. At this point, JSTOR has not licensed to consortia. Guthrie explained that JSTOR is itself a kind of consortium, a not-for-profit collaboration trying to share the costs of electronic archiving across as many institutions as possible. Further, while JSTOR would be happy to pass along savings yielded by working with consortia, these savings are relatively small when compared with the discounts that consortia often expect.

Guthrie feels that a major value of JSTOR is its potential for substantial long-term savings in shelf space. JSTOR and its participating libraries need to study this issue, asking bottom-line questions: How much space might be saved if hard-copy backfiles can be moved to less expensive locations? What are the savings in terms of avoiding new construction and maintenance costs (shifting, etc.)?

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Johns Hopkins University Press Continues to be a Laboratory

Interviewing Michael Jensen and Ellen Sauer of the Johns Hopkins University Press is like visiting an idea factory. As JHUP, working in conjunction with the JHU Library, was the birthplace of Project Muse, the contagious creativity of these two is not surprising.

Sauer, who manages Project Muse, is working on a project to tie 12 of Project Muse's 42 journals to their new electronic version of *The Johns Hopkins Guide to Literary Theory and Criticism*. Thus a reader of one of the journals will be able to link immediately to the *Guide* for an explanation of terms used in literary criticism. Eventually, Sauer hopes to have links work the other way—from the *Guide* to the journals—as well as to journals outside Project Muse. She uses this as an example of the dozens of enhancements to Muse journals in process that are possible only in the electronic environment.

Jensen points with pride to JHUP's electronic version of *Walker's Mammals of the World*, which he developed. One feature, impossible to achieve in a print version, is the ability to interrelate mammals

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

geographically through manipulation of geographic distribution tables that occupy 45 pages in print.

JHUP has gained widespread support in libraries for their licensing agreements and commitment to archiving. Licenses enable libraries to make Project Muse journals available electronically to all their affiliated users, as well as to unaffiliated walk-ins. Interlibrary loan is permitted, as long as it is within the "print convention," that is, print copies are sent within the current copyright guidelines. Project Muse has committed to archiving its products as long as it is in existence, and it also enables libraries to manage their own archiving of Muse titles by providing compact discs annually. Jensen points out that archiving is a particularly important issue in electronic publications since electronic versions of scholarly publications will increasingly diverge from paper versions in actual content.

According to Jensen, JHUP is looking at "arena publishing"—as are many other publishers. This approach will provide consumers packages of publications—journals, monographs, papers, etc., that focus on one arena (e.g., literary criticism) providing in depth coverage for faculty and students.

Both Jensen and Sauer credit the strong partnership with librarians at Johns Hopkins for the success of Project Muse and other JHUP projects.

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Elsevier Introduces Science Direct

For two years, Elsevier has offered EES (Elsevier Electronic Subscriptions), a service that enabled libraries to mount electronic journals locally after print publication had taken place. With Science Direct, all Elsevier journals will be available at or before print publication and will be accessible from Elsevier's server. Also in the works are plans to offer segmented services; CardioSource will be one of the first—it will include all Elsevier journals related to cardio-pulmonary health care.

Electronic Scholarly Publication
Transforming Libraries
Issues and Innovations in
JUNE 1997
3

Karen Hunter of Elsevier cites several characteristics of the field of electronic scholarly communication at the present time:

- There is a great deal of preoccupation, resulting in some part from competitive peer pressure, with getting masses of material up and available, even though business models are still unclear;
- There is a tremendous amount of energy going into building content;
- Many publishers are moving steadily to a place where electronic format is the routine and paper is an alternative;
- Costs are more likely to continue their upward trend; in fact, charging true costs for electronic products at this point would simply drive customers away;
- Publishers have to be concerned about moving too fast and leaving customers in the "technological dust;"
- One of the key differences between electronic and print versions of journals will be the added value that electronic modes can provide, especially large datasets that are impossible to include in print journals, for example.

Elsevier has a history of partnering with libraries in the development of its products and services. Recent partners have included the University of Michigan and the British Library, with whom the publisher is working on a document delivery project.

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OCLC Continues Pioneering with FirstSearch Electronic Collections Online

OCLC distributed the first peer-reviewed electronic journal and was something of a pioneer in the late 1980s with Electronic Journals Online. To date, their efforts have been largely experimental. Over the last year and a half, however, they have been moving decisively into the distribution of scholarly journals to libraries. FirstSearch Electronic Collections Online will ultimately make thousands of journals available in electronic form to libraries; will supply subscription and document delivery access; and will provide permanent archiving for each journal. OCLC's

goal is to reduce costs for libraries, especially costs of acquisition, handling and storage of print materials.

At this point, Electronic Collections Online represents about 500 journals from 15 publishers, with a focus on science, technology, and medical resources. Publishers were chosen according to important criteria: they had to produce journals that libraries and their users would find useful, and they had to have data available in electronic form. OCLC will act as a central storage and archiving location, and libraries will subscribe to journals from the pool. Subscribers can go through subscriptions services such as Faxon, EBSCO, Blackwell, and Readmore. A preview of the new service started in March 1997 and involved 19 large library systems around the world; it will be available to all libraries in June 1997.

John Barnes, Director of Electronic Publishing for OCLC sees some order emerging from the present chaos of electronic scholarly publication, and he believes this order will resemble the traditional models libraries, publishers, and jobbers have worked with. Though many publishers are experimenting with disintermediation (going directly to the user), it is likely that libraries will continue their mediating role and that aggregators or jobbers will continue to serve them.

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Electronic Scholarly Publication: The Future

THOUGH TURBULENT CHANGE is likely to characterize developments in the field of electronic scholarly publication for a few years to come, a few trends are discernible:

- Available content will continue to grow rapidly since it is seen by many libraries as the eventual solution to severe budgetary and space constraints. Publishers are also being stimulated by competitors to increase content production. Focus will be concentrated in the high-cost arenas of scientific, medical, and technical materials.

- More libraries will join or actively participate in consortia to take advantage of collective buying. These partnerships are likely to lead to other collaborative ventures in the areas of archiving, storage, preservation, training, etc.

- Alternative modes of acquisition are on the horizon. One of these is arena publication—the collocation of resources in many formats that might be of interest to a specific subset of researchers. Another mode is transaction purchasing—the ability of the individual user to purchase single articles, or even single paragraphs, directly from vendors. (This has some commentators worried. One suggested that we try to avoid a future where "the rich can quote and the rest of us have to paraphrase.")

- The World Wide Web will dominate as the mode of access. It is a tremendous force for standardization and stabilization.

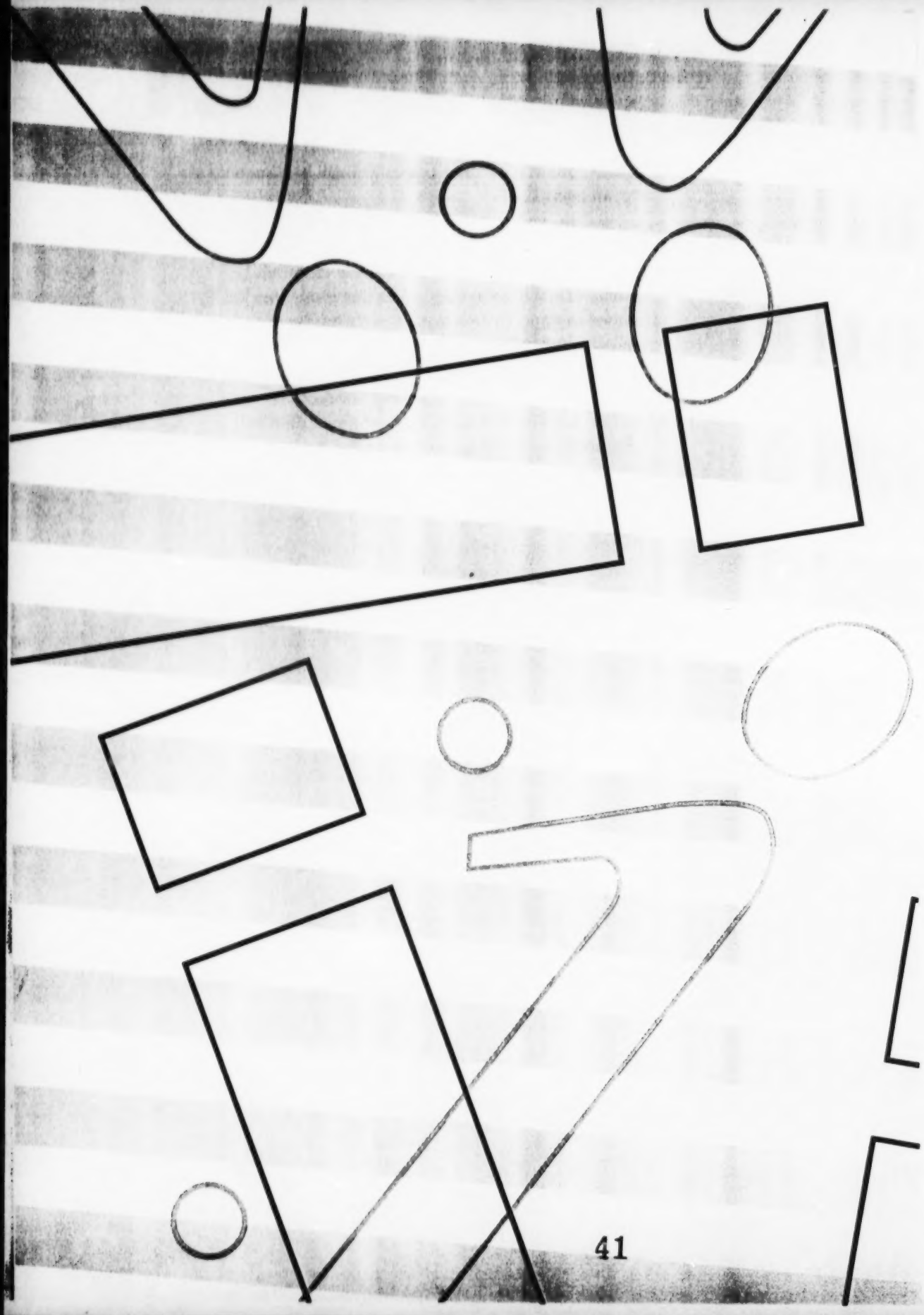
- Most publishers will soon come up to speed with

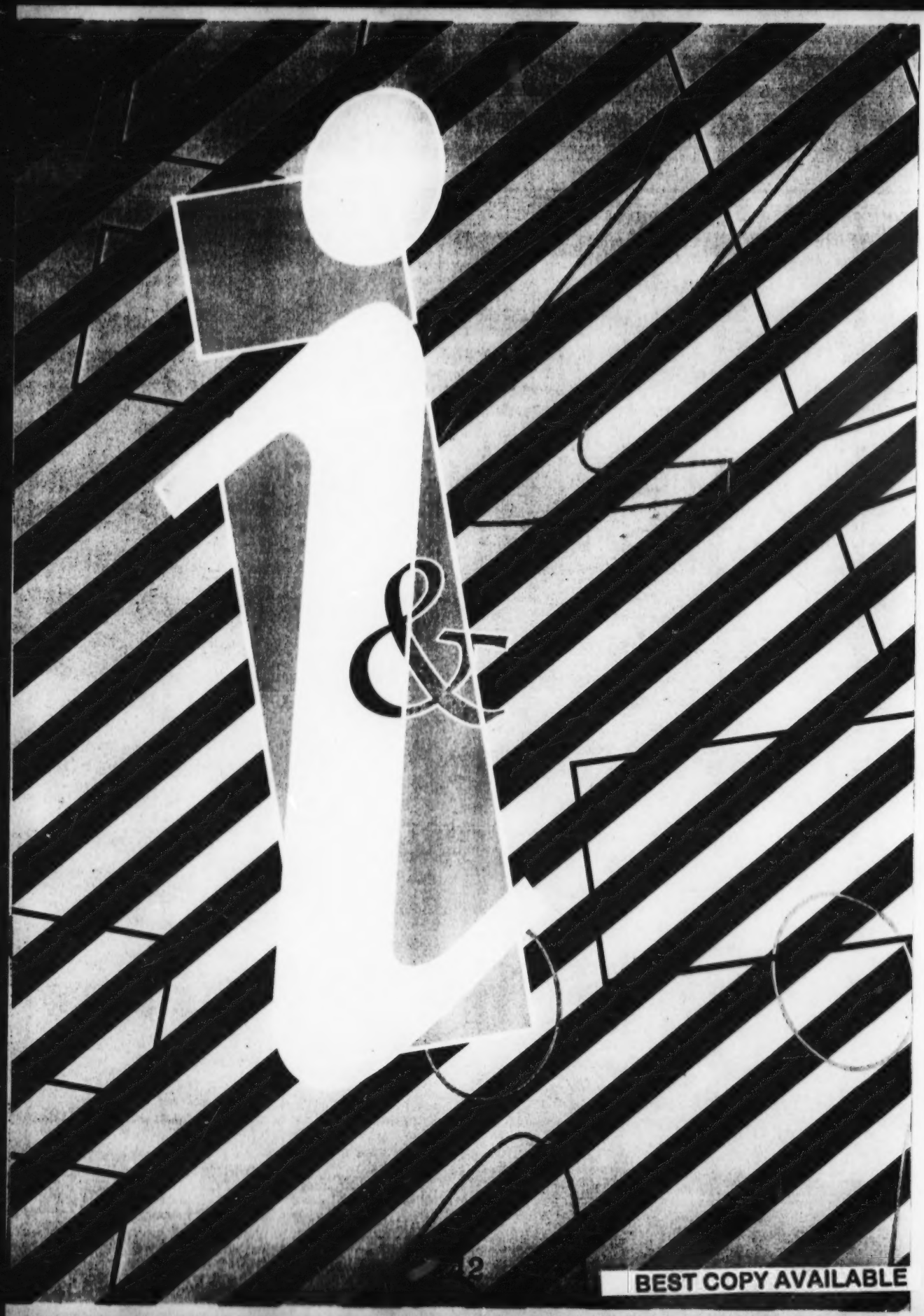
electronic publishing. Currently, electronic sophistication varies widely, with some publishers still holding onto a "print mentality."

- Though attempts at disintermediation will continue, many hope that roles and functions in electronic publication will soon stabilize so that those who are skilled in a special area (e.g., negotiating license agreements) will take over that function.

- Archiving will be handled through cooperative ventures, with the universities and major utilities (PALINET, etc.) taking a strong lead.

- Technical advances will continue, even as the focus is on building content. A much-needed advance is the building of direct links from indexing and abstracting resources to, for example, the actual text of journal articles, reports, etc. One professional predicts that, after all the innovations are in, only the easy-to-use resources will survive and prevail.





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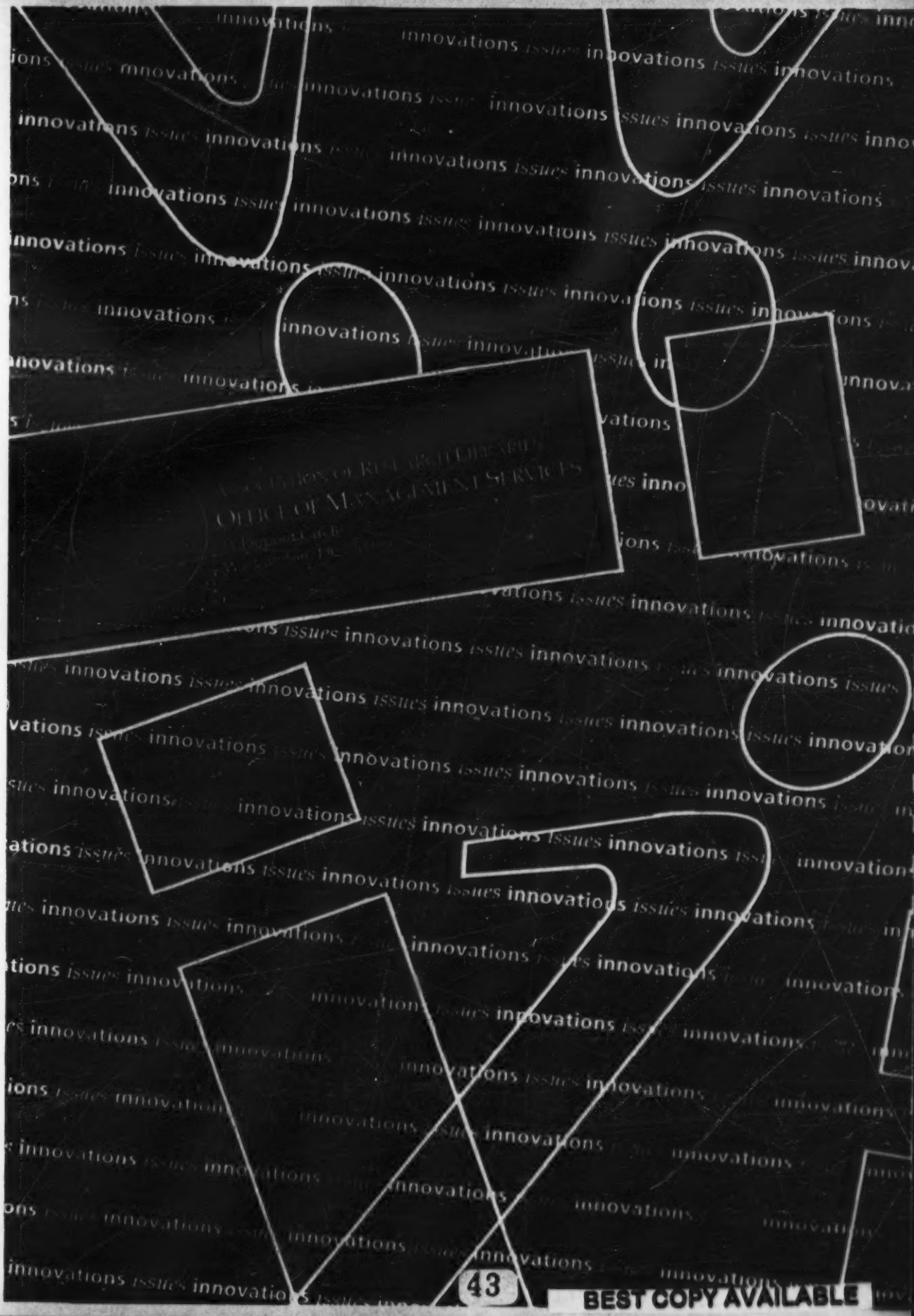

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